

Los Alamos National Laboratory

Critical Skills Development and Student Pipeline

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Los Alamos National Laboratory

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Executive Summary

The Education Program Office applies the scientific and technical resources of Los Alamos National Laboratory to critical needs in workforce development and education. Its goals are to carry out the following:

- Identify, develop, and inspire future scientific leaders;
- Increase the diversity of the Laboratory student employment pipeline;
- Ensure a highly trained, diverse workforce for the Laboratory;
- Facilitate systemic change in mathematics and science education; and
- Serve as a national model to improve the quality of science, mathematics, engineering, and technology education.

Measured by these goals, fiscal year 2003 was a time of growth and achievement for the Critical Skills Development and Student Pipeline Programs. There were major successes.

- One of our major FY03 objectives was educational “capacity building” in the schools of northern New Mexico, where we are seeking to improve teacher training and the presentation of science and technology so that students will become well-prepared, eager learners and potential future employees. Because of such programs as the Math and Science Academy, teachers changed the way they taught and principals changed their approach to leadership during the year. As a result, it will be possible for our programs to move on to new school districts in the future, knowing that the people trained in the past can maintain their knowledge and share it with others.

- Another of our objectives in FY03 was to meet specific development needs expressed by Laboratory divisions. We added four new programs to our suite of critical-skills and student-pipeline initiatives in FY03—the High-Explosives Engineering Training Program, the Glovebox Technician Pipeline Program, the College Cyber Defenders Program, and the Accelerated Strategic Computing Initiative Internship Program. All four produced strong first-year results. Programs such as these encourage and assist excellent students with diverse backgrounds in developing the skills that will make them prime candidates for employment in highly specialized, hard-to-fill jobs essential to Department of Energy (DOE) and Laboratory missions.

- We seek to provide practical, hands-on experience whenever possible, and three of the older Laboratory technology-outreach efforts—Go Figure, Robotics, and the Adventures in Supercomputing Challenge (the Challenge)—added successful internships in FY03.

- In addition, all of the critical-skills programs worked hard in FY03 to establish more definitive criteria for measuring success.

In FY03, more than 2,000 students and faculty members participated in research and learning activities in the fields of mathematics, science, engineering, and technology. High

school, college, and graduate school students involved in programs at the Laboratory had daily access to staff members and mentors and had an opportunity to present their work at the Student and Postdoctoral Symposium.

Laboratory mathematics activities ranged from identifying latent talent in young people through “Go Figure” activities to allowing young computer whizzes (assisted by mentors) to use the Laboratory’s supercomputers to complete their projects for the Challenge.

Student science activities ranged from the hands-on engineering approach of the Dynamics Summer School (DSS) to the high-level physics education provided by the Applied Science Internship Program. In some cases, Laboratory scientists provided mentoring, teaching, and assistance with highly complex doctoral theses—efforts proven to motivate outstanding students to return to Los Alamos once they have completed doctoral degrees.



Española Middle School East students Kimberly Rodriguez and Jenine Ocana, left to right, work on math assignments in the classroom of Jimmy Montoya, a teacher in the Math and Science Academy.

Engineering student activities were focused on multidisciplinary research in teams. They also emphasized extensive work on written and oral communication skills. The Laboratory continued to provide student access to some of the most advanced technology in the nation.

The Office of Defense Programs of the National Nuclear Security Administration, DOE, is the primary funding agency for these student programs. Additional funding is provided by other DOE offices, the National Science Foundation, the New Mexico Department of Education, the Commission on Higher Education, the National Aeronautics and Space Administration, and other sources including technologically oriented companies.

Section 1 of this report covers Critical Skills Development projects supported jointly by the DOE Office of University Partnerships and by Laboratory management. These projects are intended to bring students to the Laboratory, to provide ongoing opportunities for the most talented candidates, and to replenish the Laboratory technical workforce. Ongoing initiatives focused students on mathematics, advanced computer systems and administration, materials science, engineering, nuclear science, physics, and robotics.

Section 2 provides a description of internship and cooperative opportunities for high school, undergraduate, and graduate students. In partnership with university faculty members, students in these programs receive exposure to a variety of technical, business, and administrative career fields at the Laboratory.

In Section 3, we outline institutional work such as all-student meetings, the Student and Postdoctoral Symposium, the Student Programs Advisory Committee, and evaluation.

The impact of the Northern New Mexico Math and Science Academy is summarized in Section 4. Impact is measured by observing teacher practices, collaboration to deliver cross-curricular units, and use of data and technology, and by analyzing student work and graphic organizers, articulation of performance standards and benchmarks, and student grades and scores on achievement tests.

Section 5 covers precollege through graduate school partnerships in science, engineering, and technology. The security of the nation depends upon increasing collaborations and the awareness and understanding of the importance of scientific endeavor. Our successful partnerships serve as national models to improve achievement in mathematics and science.

The report concludes with Section 6, demographic data about the participants in the programs summarized in sections 1 through 5.

The Critical Skills Development and Student Pipeline Program at Los Alamos is highly valuable to the Laboratory, DOE, and the nation. We are very proud of the accomplishments recorded here and look forward with enthusiasm to our future work.



Professor Mike Todd of the University of California-San Diego, left, and Karl Erickson, a UC-Los Angeles student, work together on an FY03 Dynamics Summer School project.

